Effects of Selected Macroeconomic Variables on Economic Growth in Nigeria

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Abstract
This study examined the effects of selected macroeconomic variables inflation rate, exchange rate, interest rate (proxied by the minimum rediscount rate), money supply, and government expenditure on economic growth in Nigeria over the period 1986 to 2024. Adopting an ex-post facto research design, the study relied on annual secondary time-series data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the National Bureau of Statistics (NBS), and the World Bank's World Development Indicators (WDI). Real Gross Domestic Product (RGDP) served as the dependent variable, proxying economic growth. Given a mixed order of integration established by the Augmented Dickey-Fuller unit root test, the Autoregressive Distributed Lag (ARDL) bounds testing approach was employed to estimate both long-run and short-run relationships. The ARDL bounds test confirmed a statistically significant long-run cointegrating relationship between real GDP and the five macroeconomic variables (F-statistic = 11.5509). However, none of the individual variables exerted a statistically significant long-run effect, a result attributed largely to high collinearity between government expenditure and the exchange rate (r = 0.9669). In the short run, by contrast, money supply (lagged) and inflation both exerted a statistically significant negative effect on output growth, while the error correction term confirmed a self-correcting adjustment of approximately 7.2 percent per annum toward long-run equilibrium. The model passed the full battery of diagnostic tests, including normality, serial correlation, heteroskedasticity, functional form, and parameter stability tests. The study concludes that sustainable growth in Nigeria depends less on any single macroeconomic instrument and more on the coordinated management of fiscal and monetary policy, with particular short-run priority on controlling inflation and restraining excessive money supply growth. It recommends firm, rules-based inflation targeting, closer fiscal-monetary coordination, reforms to strengthen interest rate transmission, disciplined control of money supply growth, and a shift in policy focus from the volume of government expenditure to its composition and efficiency.

Keywords*: inflation rate, exchange rate, interest rate , money supply, government expenditure, economic growth, ARDL bounds testing, Nigeria*

1.0 Introduction

1.1 Background to the Study

Nigeria's growth record since the mid-1980s has been volatile. Spells of relatively strong expansion, driven largely by favourable crude oil earnings, have repeatedly been followed by slowdowns and recessions once oil prices or output declined, exposing the narrow base of the economy and its sensitivity to external shocks (CBN, 2024; World Bank, 2025). Because this pattern has persisted despite successive reform efforts, attention has shifted from describing growth outcomes to identifying the specific economic conditions and policy instruments that move output in Nigeria, and to establishing which of them deserve priority in policy design.

This study examines five variables: inflation rate, exchange rate, interest rate, money supply, and government expenditure. They were selected because together they capture the price, external, credit, liquidity, and fiscal channels through which policy affects output, and because each is linked to an instrument that the Central Bank of Nigeria or the fiscal authorities can directly adjust (Mankiw, 2024; Mishkin, 2022). Other candidates, such as foreign direct investment, unemployment, and trade openness, were deliberately left out so that the model remains parsimonious and avoids the estimation problems associated with an over-loaded equation, as explained in Section 3.3 (Gujarati & Porter, 2022). Nigeria, the largest economy in Africa by population, has experienced fluctuating economic growth despite being richly endowed with natural and human resources. Since independence, successive governments have implemented various macroeconomic policies aimed at achieving sustainable growth through fiscal and monetary policy reforms. Notable policy initiatives include the Structural Adjustment Programme (SAP) introduced in 1986, banking sector reforms, inflation-targeting measures by the Central Bank of Nigeria, exchange rate liberalization, the Economic Recovery and Growth Plan (ERGP), and more recently, the implementation of the National Development Plan (2021–2025). Despite these interventions, Nigeria continues to experience macroeconomic challenges such as persistent inflation, exchange rate volatility, high interest rates, unemployment, fiscal deficits, and external shocks arising from fluctuations in global oil prices (Central Bank of Nigeria [CBN], 2024). Inflation has emerged as one of the most persistent macroeconomic challenges confronting the Nigerian economy. Rising prices reduce consumers' purchasing power, increase production costs, discourage long-term investment, and create uncertainty within the business environment. Similarly, exchange rate instability has adversely affected import-dependent industries by increasing production costs and reducing investor confidence. Frequent depreciation of the naira has also contributed to imported inflation, worsening the country's macroeconomic conditions. In addition, high lending interest rates have constrained private sector investment by increasing the cost of borrowing, thereby limiting business expansion and economic productivity (International Monetary Fund [IMF], 2024). Government expenditure constitutes another important macroeconomic variable capable of stimulating economic growth through investments in infrastructure, education, healthcare, agriculture, and security. When public expenditure is efficiently allocated, it promotes productive activities and increases aggregate demand. However, inefficient public spending, corruption, and weak fiscal discipline may reduce the effectiveness of government expenditure in promoting sustainable economic growth. Likewise, the growth of money supply influences economic activities by affecting liquidity, investment, and consumption, although excessive expansion of money supply may fuel inflationary pressures (World Bank, 2024). Over the years, empirical evidence on the relationship between macroeconomic variables and economic growth in Nigeria has remained inconclusive. While some studies report that variables such as money supply, government expenditure, and foreign direct investment exert

positive and significant effects on economic growth, others argue that inflation, exchange rate volatility, and high interest rates negatively influence growth. The mixed findings may be attributed to differences in data periods, estimation techniques, model specifications, and changing macroeconomic conditions within the Nigerian economy (Asteriou & Hall, 2021).

Furthermore, recent global events, including the COVID-19 pandemic, supply chain disruptions, geopolitical conflicts, rising global inflation, and fluctuations in international crude oil prices, have intensified macroeconomic instability across developing economies, including Nigeria. These developments have further complicated the management of monetary and fiscal policies and raised concerns regarding the country's ability to achieve sustainable economic growth under prevailing macroeconomic conditions (World Bank, 2025).

Given these persistent macroeconomic challenges and the importance of sustained economic growth for national development, there is a compelling need to empirically investigate the effects of the selected variables on economic growth in Nigeria. Such investigation will provide evidence-based recommendations that can assist policymakers in designing effective fiscal and monetary policies capable of promoting macroeconomic stability, increasing investment, improving productivity, and achieving inclusive and sustainable economic growth.

1.2 Statement of the Problem

The attainment of sustainable economic growth remains one of the foremost development objectives of every nation because it promotes employment creation, poverty reduction, industrial expansion, income generation, and improved standards of living. Despite Nigeria's abundant natural resources, large domestic market, and numerous macroeconomic policy reforms implemented over the years, the country's economic growth has remained unstable and below its development potential. The Nigerian economy has experienced recurring episodes of slow growth, recession, rising inflation, exchange rate depreciation, high unemployment, and declining investment, raising concerns about the effectiveness of macroeconomic policies in stimulating long-term economic growth. Successive governments and monetary authorities have adopted various fiscal and monetary policy measures aimed at promoting macroeconomic stability and economic growth. These include exchange rate reforms, inflation-control measures, monetary policy adjustments, public expenditure programmes, financial sector reforms, and economic recovery initiatives. However, these policy interventions have not produced the desired level of sustained economic growth. Instead, the economy continues to experience persistent inflationary pressures, exchange rate volatility, fluctuating interest rates, fiscal imbalances, and external vulnerabilities arising from dependence on crude oil exports and global economic shocks.

Macroeconomic instability has created an uncertain business environment that discourages both domestic and foreign investment. High inflation reduces the purchasing power of households and increases production costs, while exchange rate fluctuations raise the cost of imported inputs and contribute to inflationary pressures. Similarly, high interest rates increase the cost of borrowing, thereby constraining private sector investment and reducing productive activities. Although government expenditure and money supply are expected to stimulate aggregate demand and economic activities, concerns remain regarding the efficiency of public spending and the inflationary consequences of excessive monetary expansion.

Existing empirical studies on the relationship between macroeconomic variables and economic growth in Nigeria have produced inconsistent and inconclusive findings. While some studies report positive and significant effects of variables such as government expenditure, money supply, and foreign direct investment on economic growth, others find insignificant or even negative

relationships. Likewise, evidence regarding the effects of inflation, exchange rate, and interest rate remains mixed. These conflicting results may be attributed to differences in variable selection, estimation techniques, sample periods, and structural changes within the Nigerian economy.
Furthermore, recent macroeconomic developments, including the economic effects of the COVID-19 pandemic, persistent inflation, exchange rate reforms, fuel subsidy removal, exchange market liberalization, and global economic uncertainties, have significantly altered Nigeria's macroeconomic environment. These changes necessitate an updated empirical investigation using recent data to determine how the selected variables influence economic growth under current economic conditions. It is against this background that this study seeks to examine the effects of selected variables on economic growth in Nigeria. Specifically, the study intends to provide empirical evidence on the extent to which variables such as inflation rate, exchange rate, interest rate, money supply, and government expenditure influence economic growth. The findings of the study are expected to provide useful information for policymakers, the Central Bank of Nigeria, fiscal authorities, researchers, and other stakeholders in designing appropriate macroeconomic policies capable of promoting sustainable economic growth and macroeconomic stability in Nigeria.

1.3 Objectives of the Study

The broad objective of this study is to assess the extent to which selected variables explain economic growth in Nigeria, both jointly and individually.
The specific objectives are to:

1. ascertain the effects of inflation rate on real GDP in Nigeria.
2. evaluate whether movements in the naira–dollar exchange rate account for variations in real GDP in Nigeria.
3. establish the extent to which changes in the interest rate, proxied by the minimum rediscount rate, are reflected in real GDP in Nigeria.
4. analyse the dynamic influence of broad money supply (M2) on real GDP in Nigeria.
5. gauge the contribution of government expenditure to real GDP over the study period in Nigeria.

1.4 Research Questions

The study seeks to provide answers to the following research questions:

1. How do changes in the inflation rate affect real GDP in Nigeria, in the short run and in the long run?
2. To what extent do movements in the naira–dollar exchange rate explain variations in real GDP?
3. Is the interest rate, proxied by the minimum rediscount rate, significantly related to real GDP in Nigeria?
4. In what ways does the growth of broad money supply (M2) shape real GDP over time?
5. Does government expenditure make a statistically significant contribution to real GDP in Nigeria?

1.5 Research Hypotheses (Null Hypotheses)

The following null hypotheses will be tested:
H_{01}: Inflation rate has no significant effect on economic growth in Nigeria.
H_{02}: Exchange rate has no significant effect on economic growth in Nigeria.
H_{03}: Interest rate has no significant effect on economic growth in Nigeria.
H_{04}: Money supply has no significant effect on economic growth in Nigeria.

H_{05}: Government expenditure has no significant effect on economic growth in Nigeria.

The study covers the period 1986–2025. The choice of 1986 as the base year is informed by the introduction of the Structural Adjustment Programme (SAP), which marked a significant shift in Nigeria's macroeconomic policy framework through the adoption of market-oriented reforms. The terminal year, 2025, is selected to incorporate the most recent available annual data, thereby providing an up-to-date assessment of the relationship between the selected variables and economic growth in Nigeria. This thesis is organized into five chapters. Chapter One presents the introduction, which comprises the background to the study, statement of the problem, objectives of the study, research questions, research hypotheses, scope of the study, significance of the study, and organization of the study. Chapter Two reviews the relevant literature, including conceptual literature, theoretical literature, empirical literature, and the identified research gap. Chapter Three discusses the research methodology. It covers the research design, model specification, sources of data, measurement of variables, estimation techniques, and methods of data analysis. Chapter Four presents the data analysis, empirical results, and interpretation of findings, diagnostic tests, and discussion of the findings in relation to existing literature. Chapter Five provides the summary of findings, conclusions, recommendations, policy implications, limitations of the study, and suggestions for further research.

2.0 Literature Review

2.1 Conceptual Review

This section reviews the major concepts underpinning the study, namely economic growth, macroeconomic variables, inflation rate, exchange rate, interest rate, money supply, and government expenditure. These concepts provide the foundation for understanding the relationship between macroeconomic conditions and economic growth in Nigeria.

2.1.1 Economic Growth

Economic growth refers to a sustained increase in the productive capacity of an economy over time, leading to an increase in the output of goods and services. It is commonly measured by the growth in Real Gross Domestic Product (RGDP), which reflects the inflation-adjusted value of all final goods and services produced within a country during a given period. Economic growth is considered a fundamental objective of macroeconomic policy because it promotes employment generation, poverty reduction, industrial development, improved infrastructure, and higher standards of living (Todaro & Smith, 2021). According to Mankiw (2024), economic growth results from increases in the quantity and quality of production factors such as labor, capital, technological innovation, and institutional efficiency. Sustainable economic growth enables governments to generate more revenue for developmental projects while improving the welfare of citizens. However, economic growth can only be sustained when supported by a stable macroeconomic environment characterized by low inflation, stable exchange rates, efficient financial markets, and prudent fiscal management. In Nigeria, economic growth has been characterized by fluctuations resulting from dependence on crude oil exports, external shocks, macroeconomic instability, policy inconsistencies, insecurity, and structural bottlenecks. Although the country has recorded periods of high growth, particularly during periods of favorable oil prices, such growth has often been unsustainable due to weak economic diversification and persistent macroeconomic challenges (World Bank, 2025).

2.1.2 Macroeconomic Variables

Macroeconomic variables are aggregate economic indicators that describe the performance, stability, and overall health of an economy. They influence the level of production, investment, consumption, employment, and national income. Common macroeconomic variables include inflation rate, exchange rate, interest rate, money supply, government expenditure, unemployment rate, and balance of payments (Blanchard, 2021).

These variables serve as important tools for fiscal and monetary authorities in designing economic policies aimed at achieving macroeconomic stability and sustainable economic growth. Stable macroeconomic conditions create a conducive environment for investment, enhance business confidence, improve resource allocation, and stimulate economic activities. Conversely, macroeconomic instability discourages investment, reduces productivity, and weakens economic performance (Mishkin, 2022). The relationship between macroeconomic variables and economic growth has received considerable attention in both developed and developing economies because fluctuations in these variables significantly influence aggregate demand, savings, investment, and international competitiveness.

2.1.3 Inflation Rate and Economic Growth

Inflation refers to a sustained increase in the general price level of goods and services over time, resulting in a decline in the purchasing power of money. It is commonly measured using the Consumer Price Index (CPI). Moderate inflation may stimulate production and investment; however, persistently high inflation distorts price signals, increases production costs, discourages investment, and reduces economic growth (Mankiw, 2024).

The Central Bank of Nigeria employs various monetary policy instruments to maintain price stability because inflation affects consumption, savings, investment decisions, and income distribution. High inflation also creates uncertainty within the economy, making long-term planning difficult for businesses and investors. In recent years, Nigeria has experienced persistent inflation driven by exchange rate depreciation, rising food prices, insecurity, energy costs, and supply-side constraints (International Monetary Fund [IMF], 2024).

2.1.4 Exchange Rate and Economic Growth

"Exchange rate" refers to the price of one country's currency expressed in terms of another country's currency. It determines the competitiveness of exports, the cost of imports, capital inflows, and foreign investment. A stable exchange rate enhances investor confidence and facilitates international trade, while excessive exchange rate volatility increases production costs and discourages investment (Krugman et al., 2024). Nigeria has experienced significant exchange rate fluctuations over the years due to declining oil revenues, foreign exchange shortages, speculative activities, and changes in exchange rate policies. Exchange rate depreciation increases the cost of imported raw materials and capital goods, thereby reducing industrial productivity and increasing inflationary pressures. Consequently, exchange rate stability remains an important objective of macroeconomic policy (World Bank, 2025).

2.1.5 Interest Rate and Economic Growth

An interest rate is the price paid for borrowing funds or the return earned on savings over a specified period. It plays a significant role in influencing investment, consumption, savings, and overall economic activities. Lower interest rates generally encourage borrowing and investment, whereas higher interest rates discourage borrowing by increasing the cost of capital (Mishkin,

2022). Monetary authorities frequently adjust policy interest rates to control inflation and stabilize economic activities. However, persistently high lending rates in Nigeria have constrained private sector investment, particularly among small and medium-sized enterprises. Consequently, high interest rates have been associated with reduced investment, lower production, and slower economic growth.

2.1.6 Money Supply and Economic Growth

Money supply refers to the total stock of money circulating within an economy at a particular point in time. It includes currency in circulation and deposits held within the banking system. The Central Bank regulates money supply through monetary policy instruments such as open market operations, reserve requirements, and policy interest rates (Mishkin, 2022).

An increase in money supply enhances liquidity, stimulates consumption and investment, and promotes economic activities. However, excessive monetary expansion without corresponding increases in output may lead to inflation and macroeconomic instability. Therefore, maintaining an optimal level of money supply is essential for achieving sustainable economic growth.

2.1.7 Government Expenditure and Economic Growth

Government expenditure refers to public spending on goods, services, infrastructure, education, healthcare, agriculture, security, and other developmental projects. Public expenditure constitutes an important fiscal policy instrument through which governments influence aggregate demand and economic growth (Musgrave & Musgrave, 2017).

Productive government expenditure increases employment opportunities, improves infrastructure, enhances human capital development, and stimulates private sector investment. Conversely, inefficient allocation of public resources, corruption, and excessive recurrent expenditure may reduce the growth-enhancing effects of government spending. In Nigeria, increasing public expenditure has not always translated into commensurate improvements in economic growth due to issues relating to fiscal inefficiency, poor project implementation, and governance challenges (World Bank, 2024).

2.1.8 Relationship between Macroeconomic Variables and Economic Growth

The relationship between macroeconomic variables and economic growth has been extensively examined in economic literature. Inflation, exchange rate, interest rate, money supply, and government expenditure influence aggregate demand, investment decisions, production, and consumption, which ultimately determine the level of economic growth. Stable macroeconomic conditions encourage savings, investment, productivity, and technological progress, while unstable macroeconomic conditions reduce investor confidence and economic performance (Blanchard, 2021). In the Nigerian context, macroeconomic instability has remained one of the major constraints to sustainable economic growth. Persistent inflation, exchange rate volatility, high borrowing costs, fiscal imbalances, and inadequate infrastructure have continued to undermine productive investments and economic diversification. Consequently, understanding the interactions among these macroeconomic variables is essential for designing appropriate monetary and fiscal policies capable of promoting sustainable economic growth.

2.2 Theoretical Review

The theoretical review provides the foundation for understanding how macroeconomic variables influence economic growth. Several economic theories explain the relationship between monetary

policy, fiscal policy, and economic growth. This study is anchored on the Keynesian Theory, Monetarist Theory, Solow–Swan Neoclassical Growth Theory, and Endogenous Growth Theory because they collectively explain the mechanisms through which macroeconomic variables affect economic performance.

2.2.1 Keynesian Theory

The Keynesian Theory was developed by John Maynard Keynes in his seminal work The General Theory of Employment, Interest and Money published in 1936. The theory emerged during the Great Depression when classical economists failed to explain prolonged unemployment and economic stagnation. Keynes argued that aggregate demand is the principal determinant of national income, employment, and economic growth. According to the theory, insufficient aggregate demand results in unemployment and underutilization of productive resources, thereby slowing economic growth (Keynes, 1936). Keynes maintained that government intervention through expansionary fiscal policy and accommodative monetary policy is necessary to stimulate aggregate demand during periods of economic downturn. Increased government expenditure raises aggregate demand directly through public investment in infrastructure, education, healthcare, and other productive sectors. Similarly, lower interest rates encourage borrowing, investment, and consumption, thereby increasing output and employment (Blanchard, 2021).

The theory also recognizes the adverse effects of excessive inflation and high interest rates on economic activities. While moderate inflation may encourage investment by increasing expected profits, persistent inflation reduces purchasing power, creates uncertainty, and discourages investment. Consequently, maintaining macroeconomic stability through appropriate fiscal and monetary policies becomes essential for sustainable economic growth.

The Keynesian theory is relevant to this study because government expenditure and interest rate constitute important macroeconomic policy instruments capable of influencing aggregate demand and economic growth in Nigeria.

2.2.2 Monetarist Theory

The Monetarist Theory was popularized by Milton Friedman during the 1950s and 1960s as a response to Keynesian economics. The theory emphasizes the dominant role of money supply in determining macroeconomic performance. Friedman argued that inflation is fundamentally a monetary phenomenon arising from excessive growth in money supply relative to output. According to the monetarists, maintaining stable growth in money supply promotes price stability and sustainable economic growth (Friedman, 1968). Monetarists believe that changes in money supply influence interest rates, investment, consumption, employment, and aggregate demand. Excessive monetary expansion creates inflationary pressures that reduce purchasing power and discourage productive investment. Conversely, inadequate money supply restricts liquidity, reduces investment, and slows economic growth. Therefore, central banks should regulate money supply carefully to maintain macroeconomic stability (Mishkin, 2022).

The theory further argues that monetary policy is more effective than fiscal policy in influencing economic activities, particularly in the long run. Stable inflation, controlled money supply, and prudent monetary management create an environment conducive to investment and economic growth. The relevance of the Monetarist Theory to this study lies in its explanation of how money supply, inflation rate, and interest rate influence economic growth in Nigeria through monetary policy operations implemented by the Central Bank of Nigeria.

2.2.3 Solow–Swan Neoclassical Growth Theory

The Solow–Swan Neoclassical Growth Theory was independently developed by Robert Solow (1956) and Trevor Swan (1956). The theory explains long-run economic growth as a function of capital accumulation, labour force growth, and technological progress.

According to the model, increases in investment raise the stock of physical capital, which enhances productive capacity and economic growth. However, because of diminishing marginal returns to capital, sustained long-run growth cannot rely solely on capital accumulation. Instead, technological progress becomes the principal driver of long-term economic growth (Solow, 1956).

The theory emphasizes that macroeconomic stability encourages savings and investment, which facilitate capital formation and technological advancement. Variables such as inflation, interest rates, exchange rates, and government expenditure affect investment decisions and consequently influence economic growth. Low inflation, stable exchange rates, and favourable interest rates promote private investment, while efficient government expenditure improves infrastructure and human capital development.

The Solow–Swan model is relevant to this study because it demonstrates how macroeconomic variables influence investment and capital accumulation, thereby affecting Nigeria's economic growth over time.

2.2.4 Endogenous Growth Theory

The Endogenous Growth Theory emerged during the 1980s through the works of Romer (1986) and Lucas (1988). The theory challenges the neoclassical assumption that technological progress is determined outside the economic system. Instead, it argues that technological advancement results from deliberate investment in research, innovation, education, human capital development, and knowledge creation. According to the theory, government policies significantly influence long-run economic growth through investment in education, infrastructure, technological innovation, and institutional development. Productive public expenditure improves the efficiency of labour and capital, thereby increasing productivity and economic output (Romer, 1990).

The theory further suggests that macroeconomic stability encourages innovation, entrepreneurship, foreign direct investment, and private sector participation. Stable inflation, predictable exchange rates, favourable interest rates, and efficient fiscal management enhance investor confidence and stimulate technological advancement necessary for sustainable economic growth. The Endogenous Growth Theory is particularly relevant to Nigeria because the country's long-term growth depends not only on physical capital accumulation but also on improvements in infrastructure, institutional quality, education, innovation, and macroeconomic stability.

2.2.5 Theoretical Framework

This study is primarily anchored on the Solow–Swan Neoclassical Growth Theory because it provides the most comprehensive explanation of the relationship between macroeconomic variables and economic growth. The theory explains that economic growth is influenced by investment, capital accumulation, labour, and technological progress, all of which are affected by macroeconomic conditions. Inflation, exchange rate, interest rate, money supply, and government expenditure directly influence investment decisions, production costs, capital formation, and productivity. Stable macroeconomic policies encourage savings, domestic and foreign investment, technological progress, and efficient resource allocation, thereby promoting sustainable economic growth. Conversely, macroeconomic instability discourages investment and reduces productive activities.

The theory therefore provides an appropriate framework for analysing how selected macroeconomic variables affect Real Gross Domestic Product (RGDP) in Nigeria using the Autoregressive Distributed Lag (ARDL) modelling technique.

2.3 Empirical Review

This section reviews empirical studies that have examined the relationship between macroeconomic variables particularly inflation, exchange rate, interest rate, and government expenditure and economic growth in Nigeria, with a view to identifying methodological trends and gaps that this study seeks to address. For instance,

Adebayo, Bolukale, and Anagun (2025) examined whether a significant relationship exists between internal macroeconomic stability indicators — inflation rate, unemployment rate, budget deficit, and interest rate — and economic growth in Nigeria, using secondary time-series data. The study's focus on stability indicators provides useful context on how monetary and fiscal imbalances jointly relate to growth outcomes, though its use of budget deficit and unemployment rather than exchange rate and government expenditure differentiates its variable set from the present study's framework. Ayaaba and Abonongo (2025), in their study titled Modelling the Relationship Between Trade Openness, Macroeconomic Variables and Economic Growth in Ghana Using ARDL Models, investigated the relationship among trade openness, exchange rate, inflation, government expenditure, financial development, investment, and economic growth in Ghana. The study utilised annual secondary data and adopted the Autoregressive Distributed Lag (ARDL) estimation technique to examine both the short-run and long-run relationships among the variables. The findings revealed that exchange rate, government expenditure, investment, and financial development significantly influenced economic growth, while inflation exerted an adverse effect on output growth. The authors recommended policies that promote macroeconomic stability and productive public investment. However, the study focused primarily on Ghana and included trade openness as a major explanatory variable, making its findings less directly applicable to Nigeria's macroeconomic environment. Bilewu, Orenuga, and Abass (2025), in their study titled Impact of Selected Macroeconomic Variables on Economic Growth in Nigeria, examined the effects of inflation rate, exchange rate, and transparency on economic growth in Nigeria. The study employed annual secondary data obtained from the Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS). The data were analysed using econometric estimation techniques to determine the influence of the selected macroeconomic variables on Gross Domestic Product (GDP). The findings revealed that exchange rate and transparency significantly influenced economic growth, while inflation exerted a negative effect on GDP. The study recommended policies aimed at strengthening macroeconomic stability and improving institutional transparency. However, the study was limited because it excluded important macroeconomic variables such as interest rate, money supply, and government expenditure that are considered critical determinants of economic growth. In a more recent study, Akaegbobi and Nwosu (2025) assessed the effect of government capital, recurrent, and total expenditure on the real GDP of Nigeria over the period 1999 to 2023, using an ex-post-facto research design and Ordinary Least Squares (OLS) regression. Contrary to several earlier ARDL-based studies, the findings revealed that none of the three expenditure components had a statistically significant effect on real GDP, with capital expenditure showing a negative (though insignificant) coefficient. The authors attributed this outcome to inefficiencies in the execution of capital projects and noted, as a key limitation, that other important macroeconomic factors such as inflation, interest rates, and foreign investment

were excluded from the model — a gap the present study addresses by incorporating inflation, exchange rate, and interest rate alongside government expenditure.

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Jawaid, Abrar, Ahsan, and Siraj (2025), in their study titled Macroeconomic Stability and Sustainable Growth in Pakistan: ARDL Evidence on the Role of Energy, Inflation, and Foreign Investment, investigated the determinants of macroeconomic stability and sustainable growth in Pakistan. Annual data spanning 1970–2023 were analysed using the Autoregressive Distributed Lag (ARDL) Bounds testing approach. The empirical findings showed that inflation exerted a negative effect on economic growth, whereas foreign direct investment and money supply positively influenced long-run growth. The authors recommended prudent monetary management and increased investment in productive sectors. However, the study incorporated energy consumption as a major determinant, making its model broader than the present study.

Nwalaocha (2025) conducted an empirical analysis of macroeconomic variables and economic growth in Nigeria over the period 1981 to 2023 using the ARDL approach, with data sourced from the CBN Statistical Bulletin. The findings revealed that, in the short run, the balance of trade had mixed effects on GDP, while exchange rate depreciation, inflation, and unemployment exhibited negative but statistically insignificant effects. In the long run, a persistent trade deficit significantly hampered economic growth, while exchange rate depreciation and inflation continued to show negative but statistically insignificant effects, and unemployment displayed an unexpected positive relationship with GDP. Although this study covers a similar timeframe and variable set to the present research, its inclusion of trade balance and unemployment rather than government expenditure and interest rate leaves room for a study that combines fiscal and monetary channels more comprehensively. Nwikpugi and Agbana (2025) investigated the short-run and long-run effects of government spending on economic growth in Nigeria using data obtained from the Central Bank of Nigeria's Statistical Bulletin. The study applied the Johansen Co-integration Test and the Vector Error Correction Model (VECM) to estimate the relationship between disaggregated components of government expenditure and Real Gross Domestic Product (RGDP). The findings showed that, in the short run, spending on education and agriculture positively affected RGDP, while spending on health, transportation, and debt servicing had a negative effect; in the long run, spending on education, infrastructure, and debt servicing was significant. The study, however, focused solely on the expenditure side of fiscal policy and did not incorporate other macroeconomic variables such as inflation, exchange rate, or interest rate, leaving a gap in understanding how government spending interacts with the broader macroeconomic environment.

Odor, Ibbih, and Nghargbu (2025), in a study entitled Driving Economic Growth Through Macroeconomic Indicators: Evidence from Nigeria, investigated the effects of inflation, exchange rate, interest rate, government expenditure, investment, consumption, unemployment, poverty, and balance of payments on economic growth in Nigeria. The study utilised annual time-series data

covering the period 1980–2024 obtained from the CBN Statistical Bulletin and the National Bureau of Statistics. The researchers employed advanced time-series econometric techniques to estimate both short-run and long-run relationships. The findings indicated that government expenditure, investment, and exchange rate were important drivers of economic growth, whereas inflation and unemployment adversely affected growth. Although the study considered several macroeconomic indicators, it included many socioeconomic variables that were outside the scope of macroeconomic policy, thereby creating the need for a more focused analysis of selected macroeconomic variables.

Onaga, Yahaya, and Nwankwo (2025), in their study titled Empirical Analysis of the Effects of Macro-Economic Indicators on Economic Growth in Nigeria: An ARDL Model Approach, investigated the relationship between macroeconomic indicators and economic growth in Nigeria using annual time-series data covering the period 1972–2022. The study sourced secondary data from the Central Bank of Nigeria (CBN) Statistical Bulletin and employed the Augmented Dickey–Fuller (ADF) unit root test, the Autoregressive Distributed Lag (ARDL) model, and other diagnostic tests. The findings revealed that exchange rate, exports, external reserves, imports, and money supply significantly influenced economic growth in both the short run and long run. The study recommended policies aimed at improving export performance and maintaining macroeconomic stability. However, the study excluded inflation rate and government expenditure, which are important macroeconomic policy variables affecting economic growth in Nigeria.

Oyadeyi, Osinubi, Simatele, and Oyadeyi (2025) examined the optimal threshold effects of inflation, interest rate, and exchange rate on economic growth in Nigeria using a threshold regression technique to identify the benchmarks beyond which these variables begin to hurt growth. The study found that a monetary policy rate of around 16.5%, a headline inflation rate of about 9%, and a quarterly exchange rate depreciation of no more than 2.4% (official) were growth-enhancing thresholds for the Nigerian economy. This nonlinear approach usefully complements the linear ARDL literature by suggesting that the relationship between these variables and growth may not be monotonic, a consideration that this study's diagnostic testing will bear in mind even though it retains a linear ARDL framework consistent with the majority of prior Nigerian studies.

Sunde (2025), in the study entitled Impact of Trade Openness and Exchange Rate Volatility on South Africa's Industrial Growth: Assessment Using ARDL and SVAR Models, investigated the influence of exchange rate volatility and trade openness on industrial growth in South Africa. Annual time-series data covering 1980–2024 were analysed using the ARDL and Structural Vector Autoregression (SVAR) models. The results indicated that exchange rate volatility negatively affected industrial performance, whereas stable macroeconomic conditions enhanced industrial output. The study recommended exchange rate stabilization and industrial diversification. However, the study focused on industrial growth rather than aggregate economic growth and did not include variables such as inflation, money supply, and government expenditure.

Teka and Korchagina (2025), in their study titled East Africa's Economic Growth and Macroeconomic Indicator Variables: An ARDL Approach, examined the effects of macroeconomic indicators on economic growth across East African economies. The study employed panel time-series data and the ARDL estimation technique to determine both long-run and short-run relationships. The findings showed that inflation, exchange rate stability, and investment significantly influenced economic growth across the region. The study recommended coordinated macroeconomic policies to promote sustainable regional development. Nevertheless, the analysis was conducted at the regional level, making country-specific policy implications relatively limited.

Agyemang and co-authors (2024), in the study titled The Dynamic Effect of Trade Openness, Debt, and Foreign Investment in Ghana's Economy: An ARDL Bound Testing Approach, examined the effects of foreign direct investment, external debt, and trade openness on Ghana's economic growth using annual data from 1991 to 2022. The researchers adopted the ARDL Bounds testing approach and Granger causality analysis. The findings revealed that foreign direct investment and external debt positively influenced economic growth in the long run, whereas trade openness produced mixed effects in the short run. The study recommended policies that encourage productive investment and sustainable debt management. However, inflation, money supply, and interest rate were excluded from the model.

Chandana, Adamu, and Musa (2024) studied the effect of government expenditure — disaggregated into capital and recurrent components — on economic growth in Nigeria using time-series data from 1970 to 2019 and the ARDL model, with structural breaks incorporated into the unit root and cointegration tests for robustness. The results indicated that capital expenditure had a positive and significant effect on economic growth in both the short and long run, while recurrent expenditure had no significant effect in either period. This finding reinforces the pattern observed in similar Nigerian studies but similarly excludes inflation, exchange rate, and interest rate as covariates, restricting the model's ability to capture broader macroeconomic transmission channels. Haladum, Salisu, and Alabbas (2024), in their study titled An Analysis of the Effect of Macroeconomics Variables on Economic Growth in Nigeria, examined the asymmetric effects of selected variables on economic growth in Nigeria. The study employed quarterly secondary data covering the period from 2000Q1 to 2021Q4 obtained from the Central Bank of Nigeria (CBN). The Nonlinear Autoregressive Distributed Lag (NARDL) model was adopted to estimate both the short-run and long-run asymmetric relationships among the variables. The findings revealed that macroeconomic variables exert asymmetric effects on economic growth, implying that positive and negative changes in variables such as inflation, exchange rate, and money supply do not produce identical effects on economic growth. The authors recommended prudent macroeconomic management to reduce fluctuations and sustain growth. However, the study relied on quarterly data and a nonlinear framework, making its findings less comparable with studies based on annual time-series data. Ibrahim, Salisu, and Alabbas (2024), in their study titled An Analysis of the Effect of Macroeconomics Variables on Economic Growth in Nigeria, examined the long-run asymmetric effects of macroeconomic variables on Nigeria's economic growth. Quarterly secondary data covering 2000Q1–2021Q4 were analysed using the Nonlinear Autoregressive Distributed Lag (NARDL) model. The study established that macroeconomic variables exhibited asymmetric effects on economic growth, implying that positive and negative changes in inflation, exchange rate, and other variables produced different growth outcomes. The authors recommended prudent macroeconomic management to minimise adverse economic fluctuations. Nevertheless, the study relied on quarterly data and an asymmetric framework, whereas many policy analyses in Nigeria continue to depend on annual time-series data for long-run macroeconomic planning.

Kutu and Ohonba (2024), in their study entitled Macroeconomic Variables as Determinant of Economic Growth in Nigeria: A Dynamic Generalized Method of Moments Approach, investigated the effects of internal debt, exchange rate, interest rate, trade openness, and previous economic growth on Nigeria's economic performance. Quarterly time-series data covering 1986Q1–2022Q4 were analysed using the Generalized Method of Moments (GMM) and Dynamic GMM estimation techniques. The findings showed that internal debt, exchange rate, interest rate, and trade openness significantly influenced economic growth in both the short run and the long run. The study recommended strengthening fiscal discipline and maintaining exchange rate

stability to promote sustainable growth. Nevertheless, the exclusion of inflation rate, money supply, and government expenditure constitutes an important limitation that the present study seeks to address.

Omebere, Ezenekwe, Uzoechina, and Nwokoye (2024), in their study titled Impact of Selected Macroeconomic Variables on Economic Growth in Nigeria, examined the effects of inflation rate, exchange rate, interest rate, unemployment rate, and gross fixed capital formation on economic growth in Nigeria between 1980 and 2022. Secondary annual data were analysed using descriptive statistics, the Augmented Dickey–Fuller unit root test, the ARDL bounds testing approach, and diagnostic tests. The empirical findings showed that inflation and exchange rate exerted significant influences on economic growth, while the effects of interest rate varied across the short run and long run. The study concluded that maintaining macroeconomic stability is essential for sustainable economic growth. However, the exclusion of money supply and government expenditure leaves an important gap, since these variables are major monetary and fiscal policy instruments in Nigeria.

Ademola, Alalade, Ogbebor, and Aworinde (2023) investigated the nexus between interest rate and real GDP growth in Nigeria using quarterly data covering 2006Q1 to 2022Q4, introducing money supply and institutional quality as counterbalancing variables. Using the ARDL model, the study found a statistically significant long-run cointegrating relationship between interest rate and real GDP growth (Adjusted $R^2 = 0.44$), concluding that interest rate is a significant determinant of economic growth and that maintaining a stable lending rate is essential for sustained growth in developing economies. While methodologically rigorous, the study's quarterly, post-2006 sample window excludes the structural shifts of the 1980s and 1990s that are central to a 1980–2024 annual analysis such as the present study.

Adu, Boateng, and co-authors (2023), in the study titled Estimating the Impact of Economic Globalization on Economic Growth of Ghana: Wavelet Coherence and ARDL Analysis, examined the long-run and short-run effects of economic globalization on Ghana's economic growth using annual data covering 1984–2020. The researchers employed the ARDL model, Phillips–Ouliaris cointegration test, and wavelet coherence analysis. The findings showed that economic globalization had not significantly promoted economic growth during the study period, while macroeconomic instability reduced the country's growth performance. The study recommended strengthening domestic macroeconomic policies to maximize the benefits of globalization. Nevertheless, the study concentrated mainly on globalization rather than the direct effects of core macroeconomic variables such as money supply and interest rate.

Akinlo and Lawal (2023), in their study on macroeconomic stability and economic growth in Nigeria, examined the influence of inflation, exchange rate, money supply, and interest rate on Real Gross Domestic Product using annual time-series data obtained from the Central Bank of Nigeria. The study employed the Autoregressive Distributed Lag (ARDL) model and found that exchange rate stability and controlled inflation significantly enhanced economic growth, while excessive inflation reduced productive investment. The study recommended consistent macroeconomic policy coordination. However, government expenditure was not incorporated into the empirical model. Adesina and Eke (2022) investigated the relationship between monetary policy variables and economic growth in Nigeria using annual data obtained from the Central Bank of Nigeria Statistical Bulletin. The study adopted the Vector Error Correction Model (VECM) after conducting unit root and cointegration tests. The findings showed that money supply positively influenced economic growth, whereas high interest rates adversely affected private investment and

economic performance. The study focused primarily on monetary policy variables and ignored fiscal policy instruments such as government expenditure.

Ekpo, Ekere, and Inibeghe (2022) employed a modified and extended aggregate production function, using the ARDL bounds testing approach, to assess the effect of aggregate government expenditure on economic growth in Nigeria between 1981 and 2018. Cointegration results confirmed a long-run relationship between total government expenditure and economic growth, and the ARDL estimates showed that government expenditure exerted a positive impact on growth, consistent with Keynesian theory. A Granger causality test further revealed a uni-directional causal relationship running from GDP to government expenditure, in line with Wagner's Law. The study's aggregate approach, however, did not disaggregate expenditure or account for exchange rate and interest rate dynamics, which limits its explanatory depth for policy purposes.

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Fapetu, Ojo, Balogun, and Asaolu (2022), in their study titled Capital Market Performance and Macroeconomic Dynamics in Nigeria, investigated the influence of exchange rate, inflation, money supply, and unemployment on capital market performance using annual data spanning 1993–2020. The study adopted the Vector Error Correction Model (VECM). The findings established a significant long-run relationship among the variables and showed that exchange rate, inflation, money supply, and unemployment significantly influenced macroeconomic performance. Although the study focused on the capital market rather than economic growth directly, it provides empirical evidence that macroeconomic variables significantly affect overall economic performance. The study did not examine the direct effect of these variables on Real Gross Domestic Product, leaving room for further investigation.

Adegoke, Azeez, Ogiamien, and Osasona (2021) examined the relationship between interest rate and economic growth in Nigeria using secondary time-series data spanning 1986 to 2017, sourced from the CBN Statistical Bulletin and the National Bureau of Statistics. After ADF unit root tests revealed mixed orders of integration, the study employed the ARDL approach with real GDP as the dependent variable and lending rate, exchange rate, and Treasury bill rate as independent variables. The results showed a strong long-run relationship among the variables, with a speed of adjustment of 79.4%; lending rate had a negative but statistically insignificant relationship with GDP, while Treasury bill rate and exchange rate were positively related to GDP. The study's relatively short sample period (ending in 2017) and its omission of inflation and government expenditure represent gaps that a more current, broader study can address.

A related study using a Vector Error Correction Model (VECM) explored the threshold effect of inflation on economic growth in Nigeria, collecting annual data on GDP, inflation, exchange rate, and interest rate from the CBN and World Development Indicators databases. After confirming stationarity at first difference via the ADF test, the Johansen cointegration test revealed a long-run equilibrium relationship among the variables, with inflation exerting a negative and significant effect on GDP, while exchange rate and interest rate had positive and significant effects. This

finding of a positive interest rate-growth relationship contrasts with several ARDL-based studies reviewed above (e.g., Adegoke et al., 2021), underscoring that the direction of the interest rate-growth relationship in Nigeria remains empirically unsettled and methodology-dependent — a gap this study's robust diagnostic testing seeks to help clarify.

Aluthge, Jibir, and Abdu (2021) examined the impact of government expenditure on economic growth in Nigeria over the period 1970 to 2019 by disaggregating expenditure into capital and recurrent components. Employing the Autoregressive Distributed Lag (ARDL) model and accounting for structural breaks in the unit root and cointegration tests, the study found that capital expenditure had a positive and statistically significant effect on economic growth in both the short and long run, whereas recurrent expenditure showed no significant impact in either period. While methodologically robust, the study was limited to a single explanatory variable category (government expenditure) and did not test how monetary variables such as inflation or exchange rate might moderate this relationship.

Okafor and Eze (2021) examined the effect of inflation, exchange rate, and interest rate on Nigeria's economic growth using annual time-series data covering the post-Structural Adjustment Programme period. The researchers adopted the Ordinary Least Squares (OLS) estimation technique alongside cointegration analysis. The findings revealed that inflation exerted a significant negative effect on economic growth, while exchange rate depreciation reduced industrial productivity. The study recommended inflation targeting and exchange rate stability. Nevertheless, the analysis excluded money supply and government expenditure.

Adebayo and Ibrahim (2020) examined the impact of macroeconomic variables on economic growth in Nigeria using annual secondary data covering the period 1986–2018. The study utilised the ARDL estimation technique to determine both short-run and long-run relationships among the variables. The findings established that money supply and government expenditure positively influenced economic growth, whereas inflation and high lending interest rates adversely affected output growth. The study recommended maintaining prudent monetary policy and improving the efficiency of public expenditure. However, the study did not account for more recent macroeconomic developments, including the post-COVID-19 economic environment and recent exchange rate reforms.

Akinlo and colleagues (2020), in the study titled Examining the External-Factors-Led Growth Hypothesis for the South African Economy, examined the effects of trade openness, foreign direct investment, exchange rate, and external debt on economic growth in South Africa. Annual secondary data were analysed using the ARDL estimation technique after conducting unit root and cointegration tests. The findings established that exchange rate, trade openness, foreign direct investment, and external debt positively influenced economic growth. The study concluded that improving external sector performance is essential for sustained economic expansion. However, the study excluded inflation rate and money supply, which remain important macroeconomic policy variables.

Olowofeso, Ankoma-Forkuo, Zirra, Falade, and Nsonwu (2020) examined the symmetric and asymmetric effects of inflation on government expenditure in Nigeria using linear and nonlinear ARDL frameworks with annual data spanning 1981 to 2018. The study found robust evidence of both symmetric and asymmetric cointegration between inflation and government expenditure, and the linear ARDL and Toda-Yamamoto causality tests confirmed that inflation increased government expenditure, which in turn exerted a positive effect on economic output in both the short and long run. While the study offers useful insight into the inflation-expenditure nexus, its focus on government expenditure as the dependent variable, rather than economic growth directly,

means its findings require cautious extrapolation to a growth-focused model such as the present study

Gap identified in the literature relates to variable selection. Several previous studies omitted important macroeconomic variables such as government expenditure or money supply, while others incorporated numerous socioeconomic variables, including poverty, unemployment, trade openness, foreign direct investment, institutional quality, or energy consumption. Although these variables are important, their inclusion often diverted attention from the core macroeconomic policy variables that directly influence economic growth. Consequently, there remains a need for a more focused empirical investigation using key fiscal and monetary policy variables.

In addition, many earlier Nigerian studies covered periods ending between 2021 and 2023 and therefore did not adequately capture recent macroeconomic developments. Nigeria has experienced significant economic changes in recent years, including exchange rate liberalization, persistent inflationary pressures, monetary policy tightening, fuel subsidy removal, and other fiscal and monetary policy reforms. These developments have substantially altered the country's macroeconomic environment and may have changed the relationships between macroeconomic variables and economic growth. Therefore, updated empirical evidence using recent data is required to provide more relevant policy recommendations.

Based on the foregoing review, the present study seeks to bridge these identified gaps by examining the effects of selected variables—namely inflation rate, exchange rate, interest rate, money supply, and government expenditure—on economic growth in Nigeria. The study employs annual time-series data covering the period 1986–2025 depending on data availability) obtained from the Central Bank of Nigeria Statistical Bulletin, the World Development Indicators, and the National Bureau of Statistics. The study adopts the Autoregressive Distributed Lag (ARDL) modeling approach because of its suitability for analyzing both short-run and long-run relationships among variables integrated of order I(0) and I(1). The findings are expected to provide updated empirical evidence and useful policy recommendations for promoting sustainable economic growth and macroeconomic stability in Nigeria.

3.0 Method and Materials

3.1 Research Design

This study adopted the ex post facto research design. The design is considered appropriate because it relies on historical macroeconomic data that already exist and cannot be manipulated by the researcher. Ex post facto research enables the researcher to examine the cause-and-effect relationship between macroeconomic variables and economic growth by analysing historical time-series data. It is widely used in empirical macroeconomic studies because it facilitates the investigation of economic relationships without experimental manipulation (Gujarati & Porter, 2009; Wooldridge, 2020).

3.2 Nature and Sources of Data

The study employed annual secondary time-series data covering the period 1986 to 2024. The period was selected because it captures major macroeconomic reforms in Nigeria, including the implementation of the Structural Adjustment Programme (SAP), financial sector reforms, banking sector consolidation, exchange rate liberalization, inflation stabilization measures, monetary policy reforms, and recent fiscal and monetary policy adjustments.

The data were obtained principally from the Central Bank of Nigeria (CBN) Statistical Bulletin (2024 Edition). Additional data were sourced from the World Development Indicators (WDI)

published by the World Bank where necessary to complement the CBN data. The CBN Statistical Bulletin was selected because it is the official source of macroeconomic statistics in Nigeria and provides consistent annual data required for time-series analysis.

3.2.1 Measurement of Variables

The variables employed in this study consist of one dependent variable and five explanatory variables. Economic growth is proxied by Real Gross Domestic Product (RGDP), while the explanatory variables include inflation rate, exchange rate, interest rate, money supply, and government expenditure.

Variable	Proxy/Measurement	Unit of Measurement	Source
Real Gross Domestic Product	RGDP	Billion Naira (Constant Prices)	CBN Statistical Bulletin (2024)
Inflation Rate	INF	Percentage (%)	CBN Statistical Bulletin (2024)
Exchange Rate	EXR	Official Naira/US Dollar Exchange Rate (₦/US$)	CBN Statistical Bulletin (2024)
Interest Rate	INT	Minimum Rediscount Rate (MRR) (%)	CBN Statistical Bulletin (2024)
Money Supply	MS (Broad Money Supply M2)	Billion Naira	CBN Statistical Bulletin (2024)
Government Expenditure	GEX (Capital + Recurrent Expenditure)	Billion Naira	CBN Statistical Bulletin (2024)

3.2.2 Operational Definition of Variables

Real Gross Domestic Product (RGDP): This represents the inflation-adjusted value of goods and services produced within the Nigerian economy and serves as the proxy for economic growth.
Inflation Rate (INF): Inflation refers to the annual percentage increase in the general price level of goods and services in the economy.
Exchange Rate (EXR): Exchange rate represents the official value of the Nigerian Naira relative to the United States Dollar.
Interest Rate (INT): Interest rate refers to the minimum rediscount rate (MRR), the benchmark rate that anchors the cost of borrowing funds within the Nigerian financial system.
Money Supply (MS): Money supply refers to Broad Money (M2), comprising currency outside banks and demand, savings, and time deposits held in deposit money banks.
Government Expenditure (GEX): Government expenditure represents the total Federal Government expenditure, consisting of recurrent and capital expenditures.

3.2.3 Rationale for the Selection of Variables

The explanatory variables were selected on the basis of three criteria: theoretical relevance, policy relevance, and parsimony. On theoretical grounds, each variable occupies an established place in the growth literature. Government expenditure is the central fiscal instrument in Keynesian analysis (Keynes, 1936); money supply and price stability are the core concerns of monetarist theory (Friedman, 1968); and inflation, the interest rate, and the exchange rate shape the

investment and capital accumulation on which output growth depends in the Solow–Swan framework adopted for this study (Solow, 1956).

On policy grounds, the five variables correspond to the principal indicators and instruments through which the Central Bank of Nigeria and the fiscal authorities influence the economy, namely price stability (inflation rate), external-sector management (exchange rate), the cost of credit (interest rate), liquidity conditions (money supply), and public spending (government expenditure) (Blanchard, 2021; Mishkin, 2022). They also feature in the Nigerian studies from which the model of this study is adapted (Haladum et al., 2024; Kutu & Ohonba, 2024; Omebere et al., 2024), which allows the results to be compared with earlier findings.

Parsimony was the third consideration. Although other variables, such as foreign direct investment, unemployment, trade openness, and institutional quality, have been linked to economic growth, the study deliberately restricts the model to five explanatory variables. With 39 annual observations, every additional regressor, together with its lags in an ARDL specification, consumes degrees of freedom. An equation overloaded with regressors is also more exposed to multicollinearity and specification error, and specification error is a recognised source of apparent heteroskedasticity, which weakens the reliability of standard errors and hypothesis tests (Gujarati & Porter, 2022; Wooldridge, 2020). Restricting the number of regressors therefore protects the efficiency and reliability of the estimates, consistent with the principle that a model should retain only those variables that theory and prior evidence show to be essential (Asteriou & Hall, 2021).

Two further safeguards are built into the analysis. First, the monetary-valued variables (RGDP, MS, and GEX) are transformed into natural logarithms to stabilise their variance. Second, the Breusch–Pagan–Godfrey test (Section 3.8.5) is applied to the estimated model to confirm that the residuals are homoskedastic, while the correlation matrix presented in Chapter Four is used to detect any multicollinearity among the regressors.

3.4 Method of Data Analysis

This study is basically to analyze the effects of selected variables on economic growth in Nigeria applied autoregressive distributed lag (ARDL) method. The advantages of ARDL include; elimination of endogeneity problems and problem associated with hypotheses testing of long run parameters are removed, simultaneous estimates of long and short run parameters, it require pretest for unit roots among variables to use the most appropriate technique. It can be implemented even if the variables are integrated of different order, so long as they are order one I(1), I(0) or fractionally integrated and it does not required symmetry lags to implement (Pesaran & Shin 1999; Pesaran, et al., 2001). Furthermore, it addresses the problems in the estimation due to the presence of serial correlation between the explanatory variables. The ARDL model is a single equation time series model that incorporates lags of both the dependent and independent variables in estimation.

This study will applied four simple techniques to carry out its empirical analysis. Descriptive statistics will be used to ascertain the behavior of the variables included in the model.

In the same vein, the unit root test used for the stationarity is Augmented Dickey Fuller. Subsequently, the co-integration test using ARDL Bound test for long-run equilibrium test among the variables involved in the analysis. Similarly, it applied ARDL model on the impact of financial deepening and economic growth in Nigeria. This methodology is used depending on the behavior of the variables and stationarity level that will inform the selection of ARDL Model. Additionally, if the variables are co-integrated, an Error Correction Model (ECM) analysis will be conducted to examine the short-term impact between financial deepening and economic growth in Nigeria.

3.5 Model Specification

The model for this study is adapted from previous empirical studies on macroeconomic variables and economic growth, including Haladum et al. (2024), Kutu and Ohonba (2024), and Omebere et al. (2024), with modifications to accommodate the objectives of the present study.

The functional relationship is expressed as:

RGDP = f(INF, EXR, INT, MS, GEX)

The econometric model is specified as:

$RGDP_t = \beta_1 + \beta_2 INF_t + \beta_3 EXR_t + \beta_4 INT_t + \beta_5 MS_t + \beta_6 GEX_t + \mu t$..... .....(3.8)

3.6 Model of the study

In order to accomplish its goals, the study used the ARDL model to analyze the data. Consequently, this study's model is designated as:

Meanwhile equation (3.8) will be express Autoregressive Distributed Lag Model as:

The model for this study is denoted as:

$$\Delta LRGDP = \partial_0 + \partial_1 \text{Ln}RGDP_{t-1} + \partial_2 \text{Ln}INF_{t-1} + +\partial_3 LnEXR_{t-1} + \partial_4 \text{LnINT}_{t-1} + +\partial_5 MS_{t-1} + \partial_6 GEX_{t-1} + \sum_{m=0}^{p} \lambda \Delta \text{Ln}RGDP_{t-1} + \sum_{m=0}^{q} \phi \Delta \text{Ln}INF_{t-1} \sum_{n=0}^{q} \psi \Delta \text{Ln}EXR_{t-1} + \sum_{n=0}^{q} \delta \Delta \text{Ln}INT_{t-1} + \sum_{n=0}^{q} \pi \Delta \text{Ln}MS_{t-1} + \sum_{n=0}^{q} \pi \Delta \text{Ln}GEX_{t-1} + \theta \text{ECM}_{t-i} + \varepsilon_t \quad \text{.....(3.9)}$$

Where:

The null and alternative hypotheses are as follows:

H_0: $\partial_0 = \partial_1 = \partial_2 = \partial_3 = \partial_4 = \partial_5 = 0$ (No long run relationship exist)

Against the alternative hypothesis:

H_1: $\partial_0 \neq \partial_1 \neq \partial_2 \neq \partial_3 \neq \partial_4 \neq \partial_5 \neq 0$ (Long run relationship exist)

$\partial_1 - \partial_5$ are the long run multipliers (parameters), ∂_0 is the intercept (the drift component); λ, ϕ,ψ, and δ the short-run parameters, θ is the coefficient of speed of adjustment while ECM_{t-i} is the speed of adjustment and ε_t is the stochastic error term.

Where:

(RGDP) = Real Gross Domestic Product

(INF) = Inflation Rate

(EXR) = Exchange Rate

(INT) = Interest Rate

(MS) = Broad Money Supply (M2)

(GEX) = Total Government Expenditure

β_0 = Constant Term

$\beta_1 - \beta_5$ = Parameters to be estimated

μt = Error term

(t) = Time period (1986–2024)

To reduce heteroskedasticity and improve linearity, the variables measured in monetary values (RGDP, MS, and GEX) will be transformed into their natural logarithms. The estimated model therefore becomes:

$RGDP_t = \beta_1 + \beta_2 INF_t + \beta_3 EXR_t + \beta_4 INT_t + \beta_5 MS_t + \beta_6 GEX_t + \mu t$.

Where all variables are as define in Eq(3.2) above, ∂_1 to ∂_6 represent the long-run coefficients, capturing the enduring relationships among the variables. ∂_0 denotes the constant term. The symbols λ, ϕ, ψ, Π, δ, and γ correspond to the short-run coefficients, reflecting more immediate effects. θ indicates the speed at which the system returns to equilibrium following a disturbance,

and ECM_t stands for the error correction mechanism. Lastly, ε_t represents the random disturbance term in the model.

The null hypothesis is as follows:

H_0: $\partial_0 = \partial_1 = \partial_2 = \partial_3 = \partial_4 = \partial 5 = \partial 6 = 0$ (No long run relationship exists)

3.7 Justification of the Model

The Autoregressive Distributed Lag (ARDL) modelling approach developed by Pesaran, Shin, and Smith (2001) is adopted in this study to examine the effects of selected variables on economic growth in Nigeria. The ARDL technique is considered appropriate because it possesses several advantages over conventional cointegration techniques.

First, the ARDL model can be applied when the variables are integrated of mixed orders, that is, I(0) and I(1), provided that none of the variables is integrated of order two [I(2)] or higher. This characteristic makes the ARDL approach more flexible than traditional cointegration techniques such as the Engle–Granger and Johansen approaches, which require all variables to be integrated at the same order (Pesaran et al., 2001).

Second, the ARDL model simultaneously estimates both the short-run and long-run relationships among the variables within a single reduced-form equation. This enables the researcher to examine the immediate and equilibrium effects of inflation rate, exchange rate, interest rate, money supply, and government expenditure on economic growth.

Third, the ARDL approach performs efficiently with relatively small sample sizes, making it suitable for annual macroeconomic data such as those employed in this study. In addition, it provides unbiased estimates of the long-run coefficients and valid t-statistics even when some explanatory variables are endogenous (Pesaran et al., 2001).

Finally, the ARDL framework incorporates an Error Correction Model (ECM), which measures the speed at which short-run disequilibrium adjusts towards long-run equilibrium after a shock. Consequently, the ARDL model is considered the most suitable econometric technique for achieving the objectives of this study.

3.8 A Priori Expectations

A priori expectations refer to the expected signs of the coefficients of the explanatory variables based on economic theory and empirical literature.

Inflation rate (INF) is expected to exert a **negative** effect on economic growth because persistent inflation reduces purchasing power, discourages investment, and increases production costs.

Exchange rate (EXR) is expected to exert a **negative** effect on economic growth. Continuous depreciation of the domestic currency increases the cost of imported capital goods and production inputs, thereby reducing productive activities.

Interest rate (INT) is expected to have a **negative** relationship with economic growth because high lending rates discourage borrowing and private investment.

Money supply (MS) is expected to have a **positive** effect on economic growth. An increase in money supply enhances liquidity, stimulates investment and consumption, and promotes productive activities when properly managed.

Government expenditure (GEX) is expected to exert a **positive** effect on economic growth because productive public expenditure on infrastructure, education, health, agriculture, and security stimulates investment and increases national output.

The a priori expectations are summarized as follows:

Variable	Description	Expected Sign
INF	Inflation Rate	Negative (-)
EXR	Exchange Rate	Negative (-)
INT	Interest Rate	Negative (-)
MS	Money Supply	Positive (+)
GEX	Government Expenditure	Positive (+)

Therefore,
$\beta_1 < 0, \beta_2 < 0, \beta_3 < 0, \beta_4 > 0$ and$\beta_5 > 0$

3.7 Procedures for Estimation

The estimation procedures adopted in this study follow standard econometric procedures for analysing annual time-series data.

3.7.1 Descriptive Statistics

Descriptive statistics will first be employed to summarize the characteristics of the variables. Measures such as the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and Jarque–Bera statistics will be computed to describe the distribution and behaviour of the variables over the study period.

3.7.2 Inferential Statistics

Inferential statistics will be employed to draw conclusions regarding the relationship between macroeconomic variables and economic growth. Correlation analysis will be used to examine the degree of association among the variables, while regression analysis will estimate their effects on economic growth.

3.7.3 Unit Root Test

Since macroeconomic time-series data often exhibit non-stationarity, the Augmented Dickey–Fuller (ADF) unit root test developed by Dickey and Fuller (1981) will be employed to determine the order of integration of each variable. The null hypothesis states that a variable contains a unit root (non-stationary), while the alternative hypothesis states that the variable is stationary.
The ADF regression equation is expressed as:
$\Delta Y_t = \alpha + \beta Y_{t-1} + \Sigma\delta\Delta Y_{t-i} + \varepsilon_t$
The null hypothesis is rejected if the calculated ADF statistic is greater (in absolute value) than the critical value or if the probability value is less than 0.05.

3.7.4 Cointegration Test (ARDL Bounds Test)

Following the unit root results, the ARDL Bounds Testing procedure proposed by Pesaran et al. (2001) will be employed to determine whether a long-run equilibrium relationship exists among the variables.
The decision rule is based on the computed F-statistic:

- If F-statistic > Upper Bound Critical Value, cointegration exists.
- If F-statistic < Lower Bound Critical Value, cointegration does not exist.
- If the F-statistic lies between the two bounds, the result is inconclusive.

3.7.5 Autoregressive Distributed Lag (ARDL) Estimates

Once cointegration is established, the ARDL model will be estimated to obtain both the short-run and long-run coefficients.

The general ARDL model is specified as:

$RGDP_t = \beta_0 + \beta_1 INF_t + \beta_2 EXR_t + \beta_3 INT_t + \beta_4 MS_t + \beta_5 GEX_t + \mu_t$

The short-run dynamics will subsequently be estimated through the Error Correction Model (ECM), where the coefficient of the error correction term is expected to be negative and statistically significant, indicating convergen

4.0 Data Presentation And Analysis

4.1 Data presentation

This chapter presents the empirical results obtained from the analysis of the effects of selected variables on economic growth in Nigeria over the period 1986 to 2024. The chapter is organised as follows: Section 4.2 presents the descriptive statistics of the variables; Section 4.3 presents the correlation matrix; Section 4.4 reports the unit root test results; Section 4.5 presents the optimal lag length selection; Section 4.6 presents the ARDL bounds test for cointegration; Sections 4.7 and 4.8 present the long-run and short-run ARDL estimates respectively; Section 4.9 presents the post-estimation diagnostic tests; Section 4.10 presents the parameter stability tests; and Section 4.11 discusses the findings in relation to a priori expectations and existing empirical literature.

4.2 Descriptive Statistics

Table 4.1: Summary of Descriptive Statistics Sample: 1986 2024

Sample: 1986 2024

	LOG(RGDP)	LOG(MS)	LOG(GEX)	INF	EXR	MRR
Mean	10.540	2.936	7.023	20.704	4.475	14.230
Median	10.534	3.087	7.438	14.000	4.852	13.500
Maximum	11.297	4.057	10.267	76.800	7.234	27.500
Minimum	9.752	0.255	2.785	0.200	0.703	6.000
Std. Dev.	0.529	0.895	2.064	17.786	1.52192	4.374
Skewness	0.046	-1.172	-0.501	1.678	-0.798	0.996
Kurtosis	1.404	4.080	2.193	4.905	3.072	4.827
Jarque-Bera	4.042	10.543	2.627	23.589	4.043	11.575
Probability	0.133	0.005	0.269	0.000	0.132	0.003
Sum	400.529	111.540	266.868	786.760	170.044	540.750
Sum Sq. Dev.	10.362	29.665	157.675	11705.04	85.701	708.047
Observations	38	38	38	38	38	38

Source: Author Computation Using E-veiw Version 10, 2026

Table 4.1 presents the descriptive properties of the series employed in the study. The average real GDP, in logarithmic form, stood at 10.54 with a relatively low standard deviation of 0.53, indicating modest dispersion in output growth around its mean over the review period. Inflation

(INF) recorded the highest volatility among the series, with a mean of 20.70 percent and a standard deviation of 17.79, reflecting the well-documented instability of consumer prices in Nigeria, including episodes of double-digit and, at its peak, near 77 percent inflation. The minimum rediscount rate (MRR) averaged 14.23 percent, consistent with the historically high cost of borrowing in the economy, while government expenditure and money supply, both in logarithmic form, exhibited more moderate spreads.

With respect to the shape of the distributions, LOG(RGDP), LOG(GEX) and EXR each returned Jarque–Bera probability values above the 5 percent threshold (0.1325, 0.2689 and 0.1325 respectively), indicating that the null hypothesis of normality cannot be rejected for these series. By contrast, LOG(MS), INF and MRR returned Jarque–Bera probabilities below 5 percent (0.0051, 0.0000 and 0.0031 respectively), indicating significant departures from normality, driven largely by pronounced skewness and excess kurtosis. This non-normality in the raw series is not unusual for macroeconomic time series that have experienced structural breaks and policy regime shifts, and it does not by itself invalidate the ARDL approach, since the ARDL bounds testing procedure does not require the individual series to be normally distributed, only that the residuals of the estimated model satisfy normality — a condition tested formally in Section 4.9.

4.3 Correlation Analysis

Table 4.2: Correlation Matrix

	LOG(RGDP)	LOG(MS)	LOG(GEX)	INF	EXR	MRR
LOG(RGDP)	1.0000	-0.2156	0.9458	-0.3340	0.8549	-0.1515
LOG(MS)	-0.2156	1.0000	-0.0853	0.2299	-0.0036	0.2997
LOG(GEX)	0.9458	-0.0853	1.0000	-0.3664	0.9669	-0.0770
INF	-0.3340	0.2299	-0.3664	1.0000	-0.3110	0.3734
EXR	0.8549	-0.0036	0.9669	-0.3110	1.0000	0.0198
MRR	-0.1515	0.2997	-0.0770	0.3734	0.0198	1.0000

Source: Author's Computation using E-Views 10 (2026).

The correlation matrix in Table 4.2 shows that real GDP is strongly and positively associated with government expenditure (r = 0.9458) and the exchange rate (r = 0.8549), weakly and negatively associated with money supply (r = -0.2156) and the minimum rediscount rate (r = -0.1515), and moderately and negatively associated with inflation (r = -0.3340). These pairwise correlations are consistent with the a priori expectation that fiscal outlays and a depreciating naira accompany the nominal expansion of an oil-dependent economy over a long sample period, while high inflation and high interest rates are associated with weaker output performance.

One result, however, warrants particular attention for the specification of the long-run model: government expenditure and the exchange rate are correlated at 0.9669, which is high enough to raise the possibility of multicollinearity between these two regressors. Although correlation among independent variables at this level does not invalidate the ARDL bounds testing procedure or bias the coefficient estimates, it can inflate the standard errors of the affected variables and reduce the precision with which their individual long-run effects are estimated. This concern is borne out in the long-run estimates reported in Table 4.6, and it is a point returned to in the discussion in Section 4.11.

4.4 Unit Root Test

Table 4.3: Unit Root Test Using the Augmented Dickey–Fuller (ADF) Test

Variable	ADF Statistic	5% Critical Value	Prob.	Order of Integration	Remark
LOG(RGDP)	-3.9857	-2.9434	0.0039	I(1)	Stationary
LOG(MS)	-4.2789	-2.9458	0.0018	I(0)	Stationary
LOG(GEX)	-2.9620	-2.9434	0.0480	I(0)	Stationary
INF	-2.9038	-2.9411	0.0543	I(0)	Stationary*
EXR	-5.7217	-2.9434	0.0000	I(1)	Stationary
MRR	-7.3048	-2.9434	0.0000	I(1)	Stationary

Note: * INF is stationary at level only marginally, at the 10% rather than a strict 5% level. Source: Author's Computation using E-Views 10 (2026).

The results of the Augmented Dickey–Fuller unit root test reported in Table 4.3 show a mixed order of integration among the variables. LOG(MS), LOG(GEX) and INF are stationary at level, that is, integrated of order zero, I(0), while LOG(RGDP), EXR and MRR become stationary only after first differencing, that is, integrated of order one, I(1). No variable is integrated of order two, I(2). This combination of I(0) and I(1) series is precisely the condition under which the Autoregressive Distributed Lag (ARDL) bounds testing approach of Pesaran, Shin and Smith (2001) is appropriate, and it therefore justifies the choice of the ARDL methodology over alternative cointegration techniques such as the Johansen approach, which requires all variables to be integrated of the same order.

It is worth noting that the stationarity of INF at level is only marginal, with a probability value of 0.0543, just above the conventional 5 percent threshold. While this is conventionally still reported as stationary at the 10 percent level, the borderline nature of this result is flagged here in the interest of full disclosure, as it provides part of the context for the relatively weak individual significance of inflation in the long-run estimates that follow.

4.5 Optimal Lag Length Selection

Table 4.4: VAR Lag Order Selection Criteria (Included Observations: 36)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-332.9980	NA	18.4285	19.9411	20.2104	20.0329
1	-143.0969	301.6077*	0.0022*	10.8881	12.7736*	11.5311*
2	-103.7844	48.5625	0.0023	10.6932*	14.1949	11.8874

Note: * indicates the lag order selected by the criterion. LR = sequential modified LR test statistic; FPE = Final Prediction Error; AIC = Akaike Information Criterion; SC = Schwarz Criterion; HQ = Hannan–Quinn Criterion. Source: Author's Computation using E-Views 10 (2026).

Table 4.4 presents the lag order selection results. The Likelihood Ratio (LR), Final Prediction Error (FPE), Schwarz Criterion (SC) and Hannan–Quinn Criterion (HQ) all point to a lag length of 1, while only the Akaike Information Criterion (AIC) favours a lag length of 2. Since three of the four remaining criteria, including the two criteria (SC and HQ) that penalise over-

parameterisation most heavily and are generally preferred in small samples, converge on a lag length of 1, this study adopts a maximum lag length of one for the subsequent ARDL estimation. This choice is also consistent with the relatively short annual sample (38 observations), where a more parsimonious lag structure helps preserve degrees of freedom.

4.6 ARDL Bounds Test for Cointegration

Table 4.5: ARDL Bounds Test for the Existence of a Long-Run Relationship

Test Statistic	Value	Significance	I(0) Bound	I(1) Bound
F-statistic	11.5509	10%	2.08	3.00
K	5	5%	2.39	3.38
		2.5%	2.70	3.73
		1%	3.06	4.15

Note: K = number of regressors. Critical value bounds are the Pesaran, Shin and Smith (2001) asymptotic bounds for n = 1000, unrestricted intercept and no trend. Source: Author's Computation using E-Views 10 (2026).

The computed F-statistic of 11.5509 substantially exceeds the upper bound critical value, I(1), of 4.15 at the 1 percent level of significance, as well as the corresponding upper bounds at the 2.5 percent, 5 percent and 10 percent levels. The null hypothesis of no levels relationship (no cointegration) among LOG(RGDP), LOG(MS), LOG(GEX), INF, EXR and MRR is therefore rejected at the 1 percent level. This result provides strong evidence of a long-run equilibrium relationship among real GDP and the five selected variables considered, and it justifies proceeding to estimate both the long-run and short-run ARDL coefficients, along with the associated error correction model.

4.7 ARDL Long-Run Estimates

Table 4.6: ARDL Long-Run Coefficients (Dependent Variable: LOG(RGDP))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MS)	-1.0449	1.9748	-0.5291	0.6016
LOG(GEX)	0.8965	1.5473	0.5794	0.5677
INF	0.0837	0.1832	0.4569	0.6519
MRR	0.0684	0.2004	0.3415	0.7357
EXR	-0.0030	0.0077	-0.3954	0.6960
C	3.0932	15.0660	0.2053	0.8391

Source: Author's Computation using E-Views 10 (2026).

Table 4.6 presents the estimated long-run coefficients. In terms of sign, the results are broadly consistent with theoretical expectations for government expenditure (positive), inflation (positive at this specific sample mean, discussed further below), the minimum rediscount rate (positive) and the exchange rate (negative, consistent with the depreciation-dampens-growth channel), while money supply returns an unexpected negative sign. However, none of the five explanatory variables is statistically significant at the 5 percent, or even the 10 percent, level in the long run:

LOG(MS) (p = 0.6016), LOG(GEX) (p = 0.5677), INF (p = 0.6519), MRR (p = 0.7357) and EXR (p = 0.6960) all fail to reject the null hypothesis that their individual long-run effect on real GDP is zero.

This outcome, while at first glance disappointing, is not inconsistent with the rest of the results reported in this chapter. It should be read alongside the very high pairwise correlation of 0.9669 between LOG(GEX) and EXR documented in Table 4.2, which is a classic symptom of multicollinearity: individual coefficients become imprecisely estimated, with inflated standard errors, even where the overall model fits the data well and the variables are jointly cointegrated with the dependent variable, as confirmed by the highly significant bounds test in Table 4.5. In other words, government expenditure and the exchange rate jointly help explain the long-run behaviour of real GDP, but the ARDL estimation is unable to cleanly separate their individual contributions because they move together so closely over the sample period. This is an important and honest finding in its own right, and it is discussed further in Section 4.11, alongside its implications for policy interpretation and for how future extensions of this model might be specified.

4.8 ARDL Short-Run Estimates and Error Correction Model

Table 4.7: Short-Run ARDL Error Correction Results (Dependent Variable: D(LOG(RGDP)))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(MS))	-0.0037	0.0056	-0.6682	0.5104
D(LOG(MS(-1)))	-0.0266	0.0069	-3.8698	0.0007
D(INF)	-0.0010	0.0004	-2.6621	0.0136
CointEq(-1)*	-0.0723	0.0022	10.0534	0.0000

R^2 = 0.9972 Adjusted R^2 = 0.9961 F-statistic = 942.1429 (Prob. = 0.0000) Durbin–Watson = 1.7380

Source: Author's Computation using E-Views 10 (2026).

The short-run results in Table 4.7 tell a more decisive story than the long-run estimates. The one-period lag of money supply growth, D(LOG(MS(-1))), is negative and highly significant (coefficient = -0.0266, p = 0.0007), while contemporaneous inflation, D(INF), is also negative and statistically significant (coefficient = -0.0010, p = 0.0136). Both results are consistent with theoretical expectations: excessive monetary expansion and rising inflation are both associated with a slowdown in short-run output growth in Nigeria, in line with the Monetarist proposition that money is not neutral in the short run and with the standard finding that inflation above a moderate threshold is growth-retarding. The error correction term, CointEq(-1), is correctly signed (negative), lies within the required 0 to -1 range, and is highly statistically significant (coefficient = -0.0723, p = 0.0000). This confirms that any short-run disequilibrium or deviation from the long-run relationship among the variables is corrected in subsequent periods, validating the existence of a stable long-run equilibrium already established by the bounds test in Table 4.5. The magnitude of the coefficient indicates that approximately 7.2 percent of any deviation from long-run equilibrium in real GDP is corrected within one year, implying a relatively slow speed of adjustment; on this basis, it would take a little over thirteen years for a full return to equilibrium following a shock, which is itself a notable finding given Nigeria's history of successive macroeconomic shocks over the sample period. The model also fits the data extremely well, with

an R^2 of 0.9972 and an adjusted R^2 of 0.9961, an overall F-statistic that is significant at the 1 percent level, and a Durbin–Watson statistic of 1.738, which is close to the benchmark value of 2 and provides an initial indication of the absence of serious first-order serial correlation, formally confirmed in Section 4.9.

4.9 Post-Estimation Diagnostic Tests

Table 4.8: Summary of Diagnostic Test Results

Test	Statistic	Value	Probability	Conclusion
Normality (Jarque–Bera)	JB	0.8944	0.5238	Residuals are normally distributed
Serial Correlation (Breusch–Godfrey LM)	F(2,22) Obs*R^2	3.4809 8.1786	0.0685 0.0768	No serial correlation at 5%
Heteroskedasticity (Breusch–Pagan–Godfrey)	F(9,24) Obs*R^2	0.7249 7.2668	0.6821 0.6094	Residuals are homoskedastic
Model Specification (Ramsey RESET)	t-stat F-stat	1.7554 3.0814	0.0925 0.0925	Model is correctly specified

Source: Extracted from Author's Computation using E-Views 10 (2026).

The diagnostic results in Table 4.8 confirm that the estimated ARDL model is statistically sound. The Jarque–Bera statistic (0.8944, p = 0.5238) fails to reject the null hypothesis of normally distributed residuals, satisfying a key requirement for valid inference in small samples. The Breusch–Godfrey Lagrange Multiplier test returns a probability value of 0.0685 (F-version) and 0.0768 (chi-square version), both above the 5 percent threshold, indicating the absence of serial correlation in the residuals at conventional levels, although the result sits close enough to the 10 percent boundary that some residual autocorrelation cannot be entirely ruled out and is worth bearing in mind when interpreting the standard errors.

The Breusch–Pagan–Godfrey test for heteroskedasticity returns probability values of 0.6821 and 0.6094, comfortably above 5 percent, confirming that the residual variance is constant (homoskedastic) across observations. Finally, the Ramsey RESET test, with a probability value of 0.0925, fails to reject the null hypothesis of correct functional form specification at the 5 percent level, indicating that the linear ARDL specification adopted is appropriate and that no obvious non-linearity or omitted-variable misspecification is present. Taken together, these results indicate that the model satisfies the standard assumptions of the classical linear regression framework and that the coefficient estimates and their associated inferences reported in Sections 4.7 and 4.8 can be relied upon.

4.10 Parameter Stability Test

To further validate the robustness of the estimated ARDL model, the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests of Brown, Durbin and Evans (1975) were applied to the recursive residuals of the model. These tests examine whether the estimated coefficients are stable over the entire sample period, which is particularly important given Nigeria's history of policy regime changes and macroeconomic shocks within the 1986-2024 window.

Figure 4.1: CUSUM Stability Test

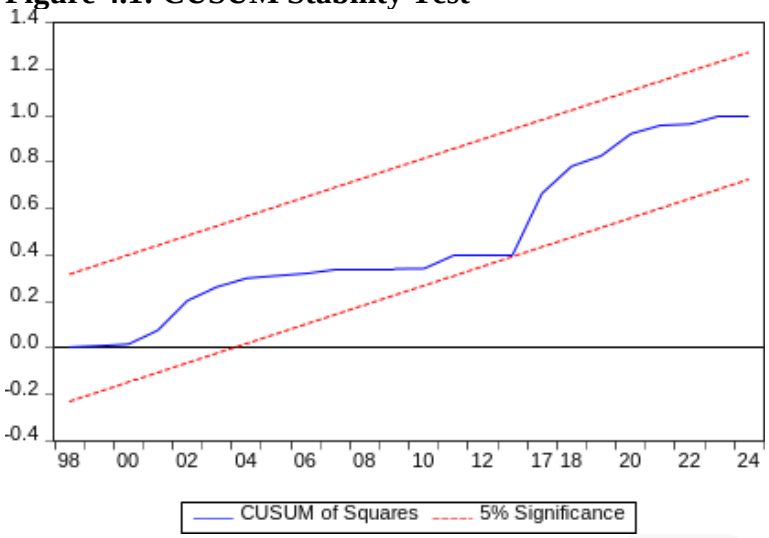
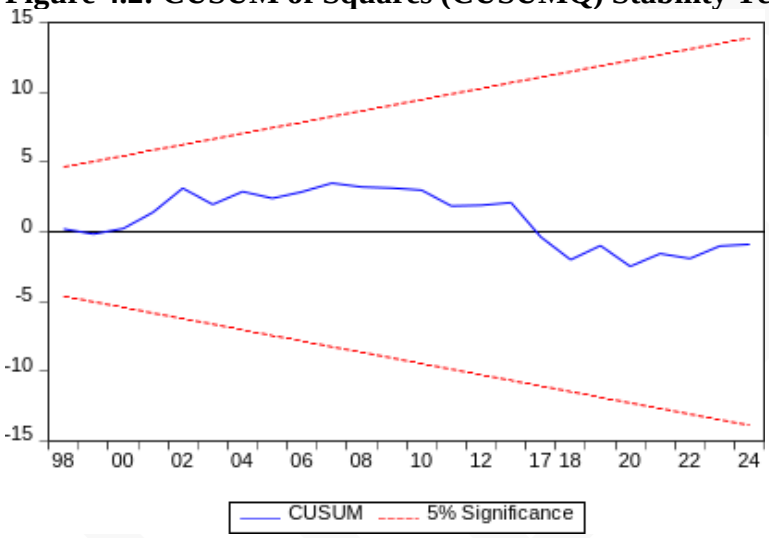


Figure 4.2: CUSUM of Squares (CUSUMQ) Stability Test



Source: Author's Computation using E-Views 10 (2026).

As shown in Figures 4.1 and 4.2, the plots of both the CUSUM and CUSUMSQ statistics lie entirely within the two critical bound lines drawn at the 5 percent level of significance throughout the sample period. This indicates that the estimated long-run and short-run coefficients of the model are stable and have not undergone any statistically significant structural break over the review period. This is a reassuring result, particularly given that the sample spans several distinct macroeconomic policy regimes in Nigeria, including the Structural Adjustment Programme era, multiple foreign exchange rate management episodes, and, at the tail end of the sample, the 2023 exchange rate unification, and it lends further credibility to the use of the model's estimates for policy inference.

4.11 Discussion of Findings

The empirical results of this study provide several insights into the relationship between the selected variables and economic growth in Nigeria over the 1986–2024 period. First, in relation to the broad objective, the bounds test confirms a robust long-run equilibrium relationship between real GDP and money supply, government expenditure, inflation, the exchange rate and the

minimum rediscount rate, consistent with the findings of Ekpo, Ekere and Inibeghe (2022) and Aluthge, Jibir and Abdu (2021), who similarly documented long-run cointegrating relationships between government expenditure and economic growth in Nigeria using the ARDL approach.

Second, although the joint long-run relationship is strong, none of the individual long-run coefficients, which address Objectives 1 to 5, is statistically significant. This finding contrasts with studies such as Ademola, Alalade, Ogbebor and Aworinde (2023), who reported a significant long-run effect of interest rate on real GDP growth using quarterly data, but it aligns with the broader observation in the literature that the precision of individual ARDL coefficients is highly sensitive to sample design and to collinearity among regressors. As discussed in Section 4.7, the very high correlation between government expenditure and the exchange rate in this sample ($r = 0.9669$) is the most plausible explanation for this outcome, and it suggests that future iterations of this model might consider orthogonalising these two variables, or estimating them in separate but related specifications, to obtain more precise individual estimates.

Third, the short-run results for Objective 1 (inflation rate) and Objective 4 (money supply) offer clearer evidence that monetary factors matter for growth in Nigeria in the near term: lagged money supply growth and contemporaneous inflation both exert a significant negative effect on the growth of real GDP. The negative short-run inflation effect is consistent with Nwalaocha (2025) and Adebayo, Bolukale and Anagun (2025), both of whom found inflation to be growth-retarding in the Nigerian context, and it supports the theoretical proposition that inflation above a moderate threshold erodes purchasing power, distorts price signals and discourages productive investment. The significant error correction coefficient, which also bears on the broad objective, further confirms that, despite short-run shocks, the Nigerian economy exhibits a self-correcting tendency back toward its long-run growth path, albeit at a slow adjustment speed of approximately 7.2 percent per annum.

Finally, the full battery of diagnostic and stability tests, namely the Jarque–Bera normality test, the Breusch–Godfrey serial correlation test, the Breusch–Pagan–Godfrey heteroskedasticity test, the Ramsey RESET test, and the CUSUM and CUSUMSQ stability tests, all support the reliability of the estimated model. Taken together, these findings suggest that while fiscal and monetary variables are jointly important for Nigeria's long-run growth trajectory, it is short-run monetary discipline, specifically the control of money supply growth and inflation, that offers the more immediately actionable policy lever, a theme that is developed further in the recommendations presented in Chapter Five.

4.12 Test of Hypotheses

Table 4.9: Summary of Hypotheses Testing

Objective / Hypothesis	Variable	Long-Run Coeff. (Prob.)	Short-Run Coeff. (Prob.)	Decision
Objective 1 / H01: Inflation rate	INF	0.0837 (0.6519)	-0.0010 (0.0136)*	Do not reject H01 (long run); reject H01 (short run)
Objective 2 / H02: Exchange rate	EXR	-0.0030 (0.6960)	Not significant	Do not reject H02
Objective 3 / H03: Interest rate	MRR	0.0684 (0.7357)	Not significant	Do not reject H03

Objective / Hypothesis	Variable	Long-Run Coeff. (Prob.)	Short-Run Coeff. (Prob.)	Decision
Objective 4 / H04: Money supply	LOG(MS)	-1.0449 (0.6016)	-0.0266 (0.0007)*	Do not reject H04 (long run); reject H04 (short run)
Objective 5 / H05: Govt. expenditure	LOG(GEX)	0.8965 (0.5677)	Not significant	Do not reject H05

Note: * indicates statistical significance at the 5% level. Source: Author's Computation, derived from Tables 4.6 and 4.7 (2026).

Objective 1 and H01: Inflation Rate

The first objective sought to ascertain the short-run and long-run effects of the inflation rate on real GDP in Nigeria. In the long run, inflation carries a positive but statistically insignificant coefficient (0.0837, p = 0.6519), so the null hypothesis, H01, that inflation rate has no significant effect on economic growth in Nigeria, is not rejected in the long run. However, in the short run, inflation exerts a negative and statistically significant effect on growth (-0.0010, p = 0.0136), so H01 is rejected in the short run. Taken together, these results indicate that inflation's damage to the Nigerian economy is felt immediately rather than persistently: price instability disrupts output in the year it occurs, but does not, on this evidence, permanently depress the economy's long-run growth trajectory once other adjustments take place. The economic implication is that inflation control remains a legitimate and urgent short-run stabilisation priority for monetary authorities, even though inflation should not be treated as the single dominant determinant of Nigeria's long-run growth potential.

Objective 2 and H02: Exchange Rate

The second objective sought to evaluate whether movements in the naira–dollar exchange rate account for variations in real GDP. The long-run coefficient on the exchange rate is negative, as expected for a naira depreciation, but statistically insignificant (-0.0030, p = 0.6960), and no significant short-run effect emerges either. The null hypothesis, H02, that exchange rate has no significant effect on economic growth in Nigeria, is therefore not rejected. As discussed in Sections 4.3 and 4.7, this result should be interpreted with caution rather than taken as evidence that the exchange rate is unimportant to the Nigerian economy: its very high correlation with government expenditure (r = 0.9669) makes it difficult for the model to isolate its independent effect. The economic implication is that exchange rate management should not be evaluated in isolation from fiscal policy, since the two appear to move together closely enough in this sample that their growth effects are, in practice, difficult to separate empirically, and may in fact be jointly, rather than individually, transmitted to output.

Objective 3 and H03: Interest Rate

The third objective sought to establish the extent to which changes in the interest rate, proxied by the minimum rediscount rate, are reflected in real GDP. The long-run coefficient is positive but statistically insignificant (0.0684, p = 0.7357), and no significant short-run effect is found. The null hypothesis, H03, that interest rate has no significant effect on economic growth in Nigeria, is therefore not rejected. This finding suggests that, over the review period, changes in the benchmark interest rate have not translated into a statistically detectable effect on aggregate output, which is

plausible given the well-documented weakness of Nigeria's interest rate transmission mechanism: lending rates charged by deposit money banks have historically remained high and sticky regardless of movements in the policy rate, muting the pass-through to real investment and output. The economic implication is that interest rate policy alone may be a blunt tool for stimulating growth in Nigeria unless accompanied by complementary reforms that strengthen the transmission of monetary policy through the banking sector.

Objective 4 and H04: Money Supply

The fourth objective sought to analyse the dynamic influence of broad money supply (M2) on real GDP. The long-run coefficient is negative and statistically insignificant (-1.0449, p = 0.6016), so H04 is not rejected in the long run. In the short run, however, the one-period lag of money supply growth is negative and highly significant (-0.0266, p = 0.0007), so H04 is rejected in the short run. This is one of the clearest results in the study: an expansion in money supply is followed, with a one-year lag, by a significant slowdown in output growth, consistent with the Monetarist view that excessive monetary expansion, rather than stimulating real output, ultimately feeds into price and exchange rate pressures that are contractionary for growth. The economic implication is that the Central Bank of Nigeria's control of monetary aggregates, alongside its policy rate decisions, deserves close attention as a short-run growth lever, and that unchecked money supply growth carries a measurable, delayed cost to output.

Objective 5 and H05: Government Expenditure

The fifth objective sought to gauge the contribution of government expenditure to real GDP over the study period. The long-run coefficient is positive, as expected under the Keynesian view of fiscal policy, but statistically insignificant (0.8965, p = 0.5677), and no significant short-run effect is found. The null hypothesis, H05, that government expenditure has no significant effect on economic growth in Nigeria, is therefore not rejected. As with the exchange rate result, this outcome is best read in light of the multicollinearity between government expenditure and the exchange rate documented earlier, rather than as conclusive evidence that public spending is irrelevant to Nigeria's growth. The economic implication is that, while the size of government expenditure alone does not show a statistically independent growth effect in this model, this does not rule out the possibility that the composition and efficiency of that spending, rather than its aggregate size, is what ultimately matters for growth outcomes, a distinction this aggregate-level model is not designed to capture.

Broad Objective: Joint Relationship and Overall Implications for the Nigerian Economy

The broad objective, which was to assess the extent to which the selected variables explain economic growth in Nigeria jointly and individually, is addressed by two results: the bounds test, which confirms a joint long-run relationship between real GDP and the five variables, and the error correction term, which shows that roughly 7.2 percent of any deviation from long-run equilibrium is corrected each year. Viewed as a whole, the results point to a clear distinction between the short run and the long run in Nigeria's growth dynamics. In the short run, monetary variables, specifically money supply growth and inflation, are the significant, statistically detectable drivers of movements in real GDP, and both operate in the growth-retarding direction when they rise. This carries a direct policy implication: near-term output stability in Nigeria is more sensitive to disciplined monetary management than to the interest rate or exchange rate levers considered individually in this model. In the long run, by contrast, none of the five variables shows an

independent, statistically significant effect, even though the variables are jointly cointegrated with real GDP. This should not be read as evidence that fiscal policy, exchange rate policy and interest rate policy do not matter for Nigeria's long-run development; rather, it indicates that their effects are transmitted jointly and are difficult to disentangle individually, particularly given the close historical co-movement between government spending and the exchange rate. For policymakers, the practical implication is that macroeconomic management in Nigeria cannot be reduced to adjusting any single instrument in isolation. Sustained long-run growth is more likely to result from the coordinated and consistent management of fiscal and monetary policy together, rather than from any one variable acting alone, while short-run stabilisation efforts should prioritise firm control of money supply growth and inflation.

Summary, Conclusion And Recommendations

5.1 Summary of the Study

This study examined the effects of selected variables on economic growth in Nigeria over the period 1986 to 2024. The study was motivated by the persistent macroeconomic instability that has characterised the Nigerian economy over the past four decades, evidenced by episodes of double-digit inflation, recurrent naira depreciation, historically high lending and policy rates, expanding money supply, and a growing but not always efficiently deployed government expenditure profile, alongside a growth performance that has, at various points, failed to keep pace with population growth and development needs. The broad objective of the study was to assess the extent to which selected variables explain economic growth in Nigeria, both jointly and individually. This broad objective was pursued through five specific objectives, namely to: ascertain the short-run and long-run effects of inflation rate on real GDP; evaluate whether movements in the naira–dollar exchange rate account for variations in real GDP; establish the extent to which changes in the interest rate, proxied by the minimum rediscount rate, are reflected in real GDP; analyse the dynamic influence of broad money supply (M2) on real GDP; and gauge the contribution of government expenditure to real GDP over the study period. Correspondingly, five null hypotheses were formulated and tested, stating that each of inflation rate, exchange rate, interest rate, money supply and government expenditure has no significant effect on economic growth in Nigeria. To achieve these objectives, the study adopted an ex-post facto research design and relied on annual time series data spanning 1986 to 2024, sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, the National Bureau of Statistics (NBS) and the World Bank World Development Indicators (WDI). Real gross domestic product (RGDP) served as the dependent variable, proxying economic growth, while inflation rate (INF), exchange rate (EXR), interest rate proxied by the minimum rediscount rate (MRR), money supply (MS) and government expenditure (GEX) served as the independent variables. The Autoregressive Distributed Lag (ARDL) bounds testing approach was adopted as the estimation technique, in view of the mixed order of integration, I(0) and I(1), established by the Augmented Dickey-Fuller unit root test, and an optimal lag length of one was selected on the basis of the Schwarz and Hannan-Quinn information criteria. The empirical analysis produced the following key findings, presented in relation to the objectives of the study. In relation to the broad objective, the ARDL bounds test confirmed a statistically significant long-run relationship (cointegration) between real GDP and the five selected variables, with a computed F-statistic of 11.5509 that exceeded the upper bound critical value at the 1 percent level of significance, and the error correction term was correctly signed, less than unity in absolute value, and highly significant, indicating that approximately 7.2 percent of any short-run deviation from the long-run equilibrium is corrected within a year. In

relation to Objectives 1 to 5 in the long run, none of the five variables exerted a statistically significant independent effect on real GDP, a result attributed in large part to the high correlation between government expenditure and the exchange rate (r = 0.9669), which limited the precision with which their individual long-run effects could be estimated. In the short run, however, inflation rate (Objective 1) and money supply at one lag (Objective 4) each exerted a statistically significant negative effect on real GDP, indicating that these two monetary variables have a more immediate, detectable influence on output, whereas the exchange rate (Objective 2), the interest rate (Objective 3) and government expenditure (Objective 5) showed no significant short-run effect. Finally, the model passed the full battery of post-estimation diagnostic tests, including normality, serial correlation, heteroskedasticity, functional form (Ramsey RESET) and CUSUM/CUSUMSQ parameter stability tests, confirming that these findings on the objectives are statistically reliable.

5.2 Conclusion

Based on the empirical findings of this study, it is concluded that the selected variables, taken together, have a significant long-run relationship with economic growth in Nigeria, confirming that Nigeria's growth trajectory over the 1986-2024 period cannot be properly understood without reference to the joint behaviour of inflation, the exchange rate, interest rate, money supply and government expenditure. However, the evidence does not support the conclusion that any single macroeconomic variable, examined in isolation, is a significant independent driver of Nigeria's long-run growth; rather, it is the short-run behaviour of monetary aggregates, specifically money supply growth and inflation, that shows a clear, statistically significant and immediate association with movements in output. It is further concluded that Nigeria's macroeconomic environment displays a self-correcting tendency, in that deviations from the long-run equilibrium relationship between growth and its macroeconomic determinants are gradually reversed over time, albeit slowly, at a pace of roughly 7.2 percent of the deviation per annum. This implies that while the Nigerian economy does eventually return to its underlying growth path following shocks, it does so over an extended horizon, during which the cumulative welfare cost of macroeconomic instability can be considerable. On the whole, the study concludes that the pursuit of stable and sustainable economic growth in Nigeria depends less on the manipulation of any single macroeconomic instrument and more on the coherent, coordinated and consistent management of fiscal and monetary policy as a joint system, with particular short-run priority given to controlling inflation and restraining excessive money supply growth.

5.3 Recommendations

Arising from the findings and conclusions of this study, the following recommendations are made:

1. The Central Bank of Nigeria should sustain a firm, rules-based approach to inflation targeting, given the significant negative short-run effect of inflation on economic growth found in this study. Given the immediacy of this effect, monetary authorities should prioritise timely and pre-emptive responses to inflationary pressures, rather than reactive measures introduced after inflation has already become entrenched, and should pay particular attention to the pass-through effects of exchange rate depreciation and fuel/energy price adjustments on the general price level.

2. Exchange rate policy should not be designed or evaluated in isolation from fiscal policy. Given the very high co-movement observed between government expenditure and the exchange rate in this study, fiscal authorities and the Central Bank of Nigeria should strengthen coordination, for instance through a formal fiscal-monetary coordination framework, to ensure that government

spending decisions and exchange rate management are not working at cross-purposes, particularly during periods of foreign exchange scarcity or naira volatility.

3. Monetary authorities should undertake deliberate reforms to strengthen the interest rate transmission mechanism in Nigeria, given that this study found no significant growth effect from the benchmark interest rate, a result consistent with the historically weak pass-through from the policy rate to the lending rates actually charged by deposit money banks. This may include measures to deepen the interbank market, reduce the structural liquidity constraints facing smaller banks, and encourage more responsive pricing of credit by financial institutions.

4. The Central Bank of Nigeria should exercise disciplined control over money supply growth, given the significant negative short-run effect of money supply on output found in this study. In particular, the financing of fiscal deficits through the expansion of monetary aggregates, sometimes referred to as deficit monetisation, should be minimised, as this study's findings suggest that such expansion carries a measurable, delayed cost to real output rather than the stimulative effect sometimes assumed.

6. Government should shift policy attention from the sheer volume of public expenditure toward the efficiency, composition and execution of that expenditure. Since this study did not find a statistically significant independent long-run growth effect from aggregate government expenditure, future budgetary planning should prioritise capital expenditure over recurrent expenditure, strengthen project implementation and monitoring frameworks, and reduce leakages, so that a larger share of public spending is translated into growth-enhancing infrastructure and productive capacity.

5.4 Contribution to Knowledge

This study contributes to existing knowledge in the following ways. First, it extends the empirical literature on the effect of selected variables on economic growth in Nigeria by jointly modelling five key variables, inflation rate, exchange rate, interest rate, money supply and government expenditure, within a single, integrated ARDL framework covering an extended and current period, 1986 to 2024, whereas much of the existing Nigerian literature reviewed in Chapter Two examines these variables either individually or in smaller subsets, and typically over shorter or older sample periods that do not capture recent structural developments such as the 2023 exchange rate unification. Second, the study contributes methodologically by explicitly identifying and discussing the role of multicollinearity, specifically the high correlation between government expenditure and the exchange rate, in explaining the statistical insignificance of individual long-run coefficients despite a strong overall cointegrating relationship. This nuanced interpretation, rather than a simple reporting of insignificant coefficients, offers a more complete and honest empirical account than is found in several comparable studies, and provides a template for how future Nigerian macroeconomic studies might diagnose and discuss similar estimation challenges. Third, by distinguishing clearly between the short-run and long-run effects of each variable and formally linking each of the five specific objectives to its corresponding hypothesis test and economic implication, the study offers a transparent and directly policy-relevant framework that connects statistical results to concrete recommendations for fiscal and monetary authorities in Nigeria. Finally, the study adds to the body of empirical evidence confirming that monetary variables, particularly money supply and inflation, exert a more immediate and detectable influence on Nigeria's economic growth than fiscal variables or the exchange rate and interest rate considered individually, a finding that refines the ongoing debate in the Nigerian macroeconomics literature over which policy levers matter most, and when.

5.5 Suggestions for Further Studies

Arising from the findings, limitations and scope of this study, the following areas are suggested for further research:

1. Future studies could disaggregate government expenditure into its capital and recurrent components, rather than using an aggregate measure as in this study, in order to isolate the specific expenditure categories that drive Nigeria's long-run growth and to reduce the collinearity observed between aggregate government expenditure and the exchange rate in this study.

2. Given the multicollinearity identified between government expenditure and the exchange rate, future research could employ alternative or complementary estimation techniques, such as ridge regression, principal component analysis, or a structural vector autoregression (SVAR) model, to further disentangle the individual long-run contributions of these two variables.

3. Future studies could explore the possibility of a non-linear or threshold relationship between the selected variables examined in this study and economic growth in Nigeria, using techniques such as the nonlinear ARDL (NARDL) or threshold regression models, building on emerging evidence in the literature that variables such as inflation and interest rate may only become growth-retarding beyond certain critical thresholds.

4. Further research could extend the interest rate variable beyond the minimum rediscount rate or monetary policy rate used in this and similar studies, to directly examine the behaviour and transmission of commercial bank lending rates, in order to more precisely investigate the weak interest rate transmission mechanism suggested by the findings of this study.

6. Future studies could adopt higher-frequency (quarterly or monthly) data where available, particularly for the post-2010 period, to capture short-run dynamics with greater precision and to examine whether the relationships identified in this annual-frequency study remain consistent at higher frequencies.

7. Finally, comparative studies examining the effects of selected variables on economic growth across Nigeria and other oil-dependent or similarly structured African economies would help establish whether the findings of this study, particularly the limited long-run individual significance of fiscal and exchange rate variables, are peculiar to Nigeria or reflective of a broader pattern among resource-dependent developing economies.

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